Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

■Product information in this catalog is as of October 2008. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

■Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.

■Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

■All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.

Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

■The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called “TAIYO YUDEN’s official sales channel”).
It is only applicable to the products purchased from any of TAIYO YUDEN’s official sales channel.

■Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. Taiyo Yuden Co., Ltd. grants no license for such rights.

■Caution for export
Certain items in this catalog may require specific procedures for export according to “Foreign Exchange and Foreign Trade Control Law” of Japan, “U.S. Export Administration Regulations”, and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.
Should you have any question or inquiry on this matter, please contact our sales staff.

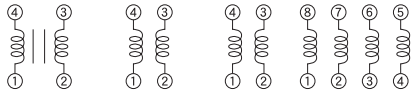
コモンモードチョークコイル (DC、信号ライン用)リードタイプ

COMMON MODE CHOKE COILS (FOR DC AND SIGNAL LINES) LEADED TYPE

OPERATING TEMP.	TLFタイプ：−25〜+115℃
	CMタイプ：−25〜+105℃

製品自己発熱含む（Including self-generated heat）

等価回路 Equivalent circuits



フロー／WAVE

特長　FEATURES

・小形軽量、高信頼性
・基板への実装が容易

・High reliability, compact and lightweight
・Easily inserted into the PCB

用途　APPLICATIONS

・TLFタイプ：低周波（AM放送波）帯域のノイズ対策
（多機能電話機、PBX,FAX等不要輻射電界及び放送波に対するイミュニティ対策）
・CM,BUタイプ：高周波（MHz）帯域のノイズ対策

・TLF Type: Countemeasure for noise in the low-frequency (AM) broad-casting band. Shields against radiated emissions in the broadcasting frequency for multi-functional telephone sets. PBXs, faxes, etc.
・CM/BU Type: Countermeasure for noise in the high-frequency (MHz) band

形名表記法　ORDERING CODE

TLF Type

1 形式

TLF	ラインフィルタ

2 コアの長辺寸法（mm）

△9	9

△＝スペース

3 形状

UB△	U字コア分割巻縦形
UBH	U字コア分割巻横形

△＝スペース

4 公称インダクタンス（μH）

例	
302	3000
203	20000

5 インダクタンス許容差（%）

W	$^{+100}_{-10}$

6 7 当社管理記号

△△	標準品

△＝スペース

T L F △ 9 U B H 3 0 2 W ○ ○
1 2 3 4 5 6 7

1 Type

TLF	Line filter

2 Dimensions of core (mm)

△9	9

△＝Blank space

3 Shape

UB△	U core, vertically split wound
UBH	U core, horizontally split wound

△＝Blank space

4 Nominal inductance (μH)

example	
302	3000
203	20000

5 Inductance tolerance (%)

W	$^{+100}_{-10}$

6 7 Internal code

△△	Standard product

△＝Blank space

CM-BU Type

1 形式

CM	コモンモードチョークコイル
BU	

2 コアの寸法（mm）

05	4.8
08	8.0
12	12.0

3 形状

RA	複線リード直出し
RB	ベース使用ピンタイプ

4 試作番号

01〜20

5 当社管理記号

△	標準品

△＝スペース

C M 0 5 R A 0 6 ○
1 2 3 4 5

1 Type

CM	Common mode choke coile
BU	

2 Core dimensions (mm)

05	4.8
08	8.0
12	12.0

3 Shape

RA	Double-wire lead
RB	Pin type with base

4 Product classification code

01〜20

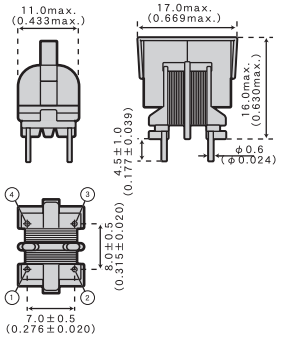
5 Internal code

△	Standard product

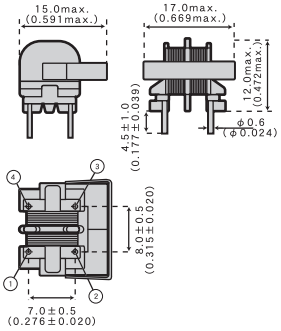
△＝Blank space

外形寸法　EXTERNAL DIMENSIONS

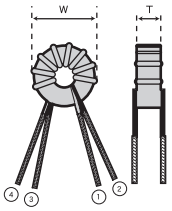
TLF9UB Type



TLF9UB H Type

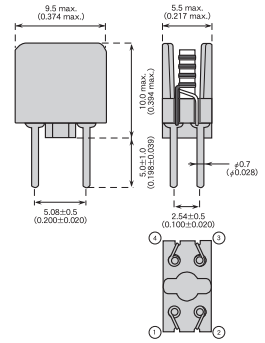


CM□□RA Type / BU08RA Type

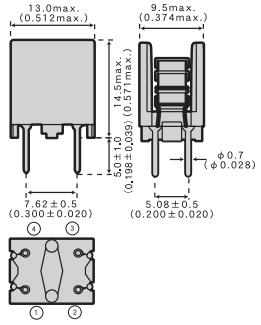


Type	W (max.)	T (max.)
CM05	6.5 (0.256)	3.0 (0.118)
CM08, BU08	11.0 (0.433)	6.0,7.0 (0.024, 0.276)
CM12	15.5 (0.610)	7.0 (0.276)

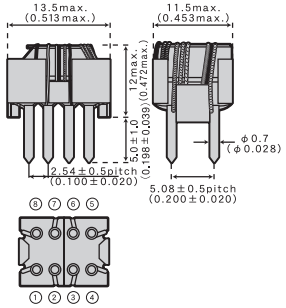
CM05RB (2Lines Type)



CM08RB (2Lines) Type



CM08RB (4Lines) Type



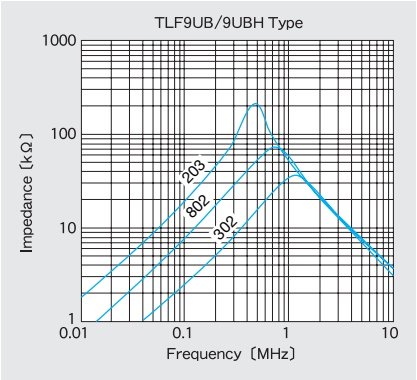
Unit: mm (inch)

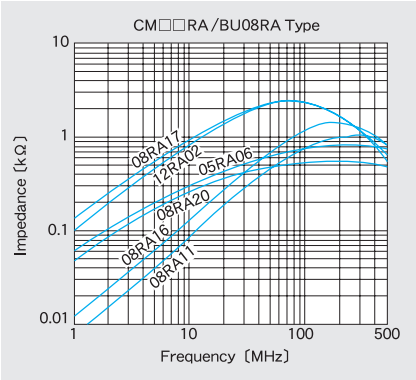
アイテム一覧　PART NUMBERS

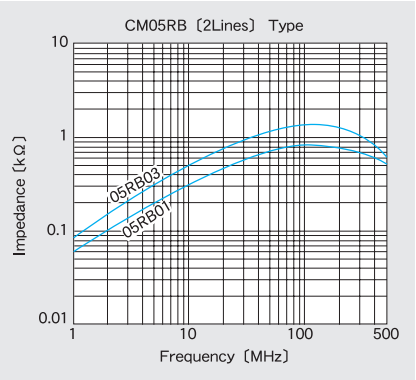
形名 Ordering code		EHS (Environmental Hazardous Substances)	ライン数 No. of lines	インダクタンス Inductance (μH) (+100 −10 %)	直流抵抗 (Ω) DC resistance (max.)	定格電流 (A) Rated current (max.)	定格電圧 (V) Rated voltage D.C.	絶縁抵抗 (MΩ) Insulation resistance (min.)	インピーダンス (KΩ) 参考値 Impedance (Reference values)
TLF9UBH302W		RoHS	2	3000	1.5	0.4	50	100	≧20 (at 1MHz)
TLF9UB 302W		RoHS							
TLF9UBH802W		RoHS		8000	3.0	0.3			≧40 (at 700kHz)
TLF9UB 802W		RoHS							
TLF9UBH203W		RoHS		20000	6.5	0.18			≧150 (at 500kHz)
TLF9UB 203W		RoHS							

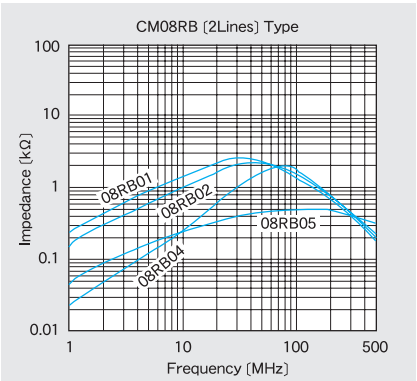
形名 Ordering code			EHS (Environmental Hazardous Substances)	ライン No.of lines	インダクタンス (μH) Inductance (at 1kHz)	インピーダンス (Ω) Impedance (typical)	直流抵抗 (Ω) DC resistance (max.)	定格電流 (A) Rated current (max.)	定格電圧 (V) Rated voltage D.C.	絶縁抵抗 (MΩ) Insulation resistance (min.)
CM05RA	06		RoHS	2	0.7min	700 (at 200MHz)	0.050	1.5	50	100
BU08RA	11		RoHS		0.7～1.3	1000 (at 250MHz)	0.013	4.0		
	16		RoHS		1.19～2.21	1200 (at 200MHz)	0.011	3.0		
CM08RA	17		RoHS		15.0min	2000 (at 80MHz)	0.040	2.4		
	20		RoHS		6.0min	500 (at 200MHz)	0.020	5.5		
CM12RA	02		RoHS		10.0min	2000 (at 80MHz)	0.040	3.0		
CM05RB	01		RoHS		7.0min	700 (at 70MHz)	0.050	2.0		
	03		RoHS		15.0min	1400 (at 100MHz)	0.060	1.5		
CM08RB	01		RoHS		40.0min	2500 (at 30MHz)	0.040	2.0		
	02		RoHS		15.0min	2000 (at 50MHz)	0.040	2.4		
	04		RoHS		110.0min	2000 (at 70MHz)	0.040	3.0		
	05		RoHS		6.0min	450 (at 100MHz)	0.020	4.0		
	03		RoHS	4	15.0min	1000 (at 50MHz)	0.050	2.0		

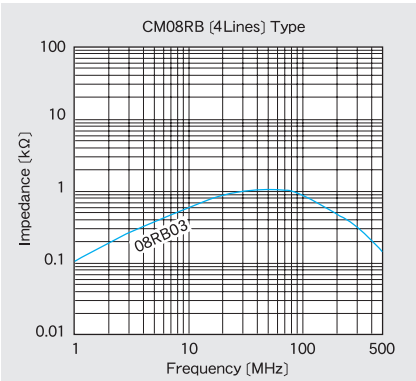
セレクションガイド Selection Guide P.14
アイテム一覧 Part Numbers P.383
特性図 Electrical Characteristics P.384
梱包 Packaging P.389
信頼性 Reliability Data P.400
使用上の注意 Precautions P.408
etc







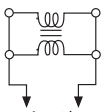




（測定条件）Measuring conditions

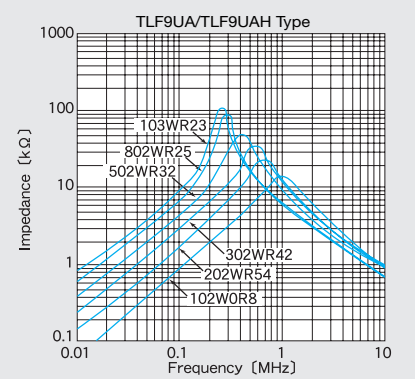
使用測定器　Equipment：HP 4291A Vosc: 0.5V (CM/BU type)
HP 4192A Vosc: 0.35V(TLF type)

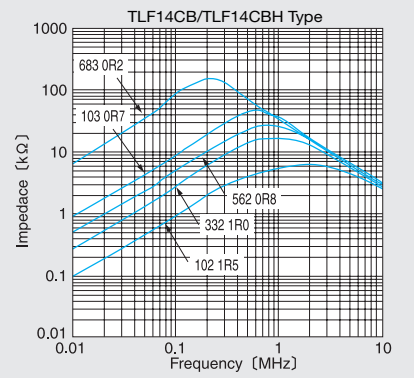
測定回路　Measuring circuit

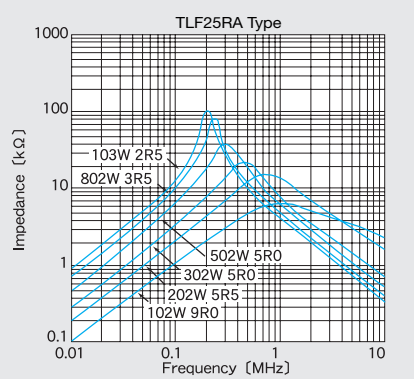


インピーダンス
アナライザーへ　To impedance analyzer

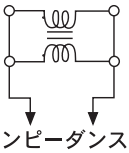
インピーダンス―周波数特性　IMPEDANCE-FREQUENCY CHARACTERISTIC







（測定条件）
使用測定器：HP−4192A
Vosc−0.35V
測定回路



インピーダンス
アナライザーへ

Test conditions
Equipment：HP−4192A
Vosc−0.35V
Test circuit

To impedance analyzer

梱包　PACKAGING

最小受注単位数 Minimum Quantity
CM / BU Type

Type	最小受注単位数（pcs.）Minimum Quantity	
	箱づめ Box	袋づめ Bulk
CM05RA06	—	500
CM05RB□□	1000	—
CM08RA□□	—	250
CM08RB□□	500	—
CM12RA02	—	100
BU08RA□□	—	200

TLF Type

Type	最小受注単位数（pcs.）Minimum Quantity
	箱づめ Box
TLF9UA□	500
TLF9UB□	500
TLF14CB□	500
TLF25RA	200

Item	Specified Value				Test method and remarks
	CM−RA/ BU−RA Type	CM−RB Type	TLF9U TLF14CB	TLF25RA	
1.Operating Temperature Range	−25〜+105℃		TLF9U：−25〜+115℃ TLF14CB：−20〜+105℃	−25〜+105℃	Including temperature rise due to self−generated heat.
2.Storage temperature range	−40〜+85℃				
3.Rated current	Within the specifed range				CM： The maximum DC value having temperature increase within specified temperature, as detailed in individual specification. TLF9UA, 14CB, 25RA： The maximum AC value having temperature increase within 45℃ by the application of AC current. TLF9UB： The maximum DC value having temperature increase within 45℃ by the application of DC current.
4.Inductance	Within the specifed tolerance				CM： Measuring equipmet：4262A（HP）or its equivalent Measuring frequency：1kHz TLF9U, 25RA： Measuring equipment：Impedance analyzer（HP4192A）or its equivalent Measuring frequency：1kHz Measuring voltage：0.35Vosc TLF14CB： Measuring equipment：LCR meter 4284A or its equivalent Measuring frequency：1kHz Measuring voltage：1.0V
5.DC resistance	Within the specifed tolerance				CM, TLF： Measuring equipment：DC ohmmeter
6.Terminal strength tensile force	No abnormality				CM： Fix the component in the direction to draw terminal and gradually apply tensile force as detailed in indiviual specifications. TLF9U： Apply the stated tensile force gradually in the direction to draw terminal. Nominal wire diameter tensile φd〔mm〕 / force〔N〕 / duration〔S〕 φ0.6 / 5 / 30±5 TLF14CB： Apply the stated tensile force gradually in the direction to draw terminal. Nominal wire diameter tensile φd〔mm〕 / force〔N〕 / duration〔S〕 φ0.8 / 10 / 30±5 TLF25RA： Apply the tensile force of 10N in the direction to draw terminal for 5 seconds.
7.Temperature rise	Refer to individual specification		45℃ max.		TLF： Resistance substitution method Applied current：Rated current Duration：1 hr
8.Insulation resistance between wires	100MΩmin.				CM・TLF： Applied voltage：Rated voltage（CM−RA/BU−RA、CM−RB） ：500VDC（TLF9UA、14CB、25RA） ：250VDC（TLF 9UB） Duration：60sec.
9.Insulation resistance between wire and core			100MΩmin.		TLF： Applied voltage：500VDC（TLF9UA、14CB） ：250VDC（TLF 9UB） Duration：60 sec.

Item	Specified Value				Test method and remarks
	CM−RA/ BU−RA Type	CM−RB Type	TLF9U TLF14CB	TLF25RA	
10.Withstanding : between wires	No abnormality				CM・TLF : Applied voltage : 250VDC (CM−RA/BU−RA、CM−RB) : 2000VAC (TLF9UA、14CB、25RA) : 500VDC (TLF 9 UB) Duration : 60sec.
11.Withstanding : between wires and core			No abnormality		TLF : Applied voltage : 2000VAC (TLF9UA、14CB) : 500VDC (TLF9UB) Duration : 60sec.
12.Rated voltage	Within the specified range				TLF9UA, 14CB, 25RA : 250VAC TLF9UB : 50VDC
13.Resistance to vibration		Appearance : No abnormality Inductance change : Within±15%	TLF9U Inductance change : Within±5% TLF14CB Within the specified range		CM, TLF : According to JIS C0040 Direction : 2hrs each in X, Y and Z direction Total : 6hrs Frequency range : 10 to 55 to 10Hz (1 min.) Amplitude : 1.5mm (shall not exceed acceleration 196m^2/s) Mounting method : soldering onto PC board Recovery : 2 to 24 hrs of recovery under the standard condition after the test. (CM−RB) : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs. (TLF9U、14CB)
14.Solderability	At least 75% of terminal electrode is covered by new solder.		Solder shall be uniformly adhered onto immersed surfaces.		CM : Solder temperature : 235±5℃ Duration : 2±0.5sec. Immersion depth : According to detailed specification. TLF : Solder temperature : 230±5℃ Duration : 2±0.5sec. (9U、25RA) : 3±0.5sec. (14CB) Immersion depth : Up to 1.0 to 1.5mm from PBC mounted level.
15.Resistance to soldering heat	Appearance : No abnormality Impedance change : Refer to individual specification		TLF9UA・TLF25RA : Inductance change : Within±5% TLF14CB Within the specified range		CM : Solder temperature : 260±5℃ Duration : 5±0.5sec. Immersion depth : Up to 2〜2.5mm from terminal root. Recovery : 1 to 2 hrs of recovery under the standard condition after the test. TLF : Solder temperature : 260±5℃ Duration : 5±1sec. (25RA) : 10±1sec. (9U、14CB) Immersion depth : Up to 1.0 to 1.5mm from PBC mounted level. Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.

Item	Specified Value				Test method and remarks
	CM−RA/ BU−RA Type	CM−RB Type	TLF9U TLF14CB	TLF25RA	
16.Thermnal shock	Appearance：No abnormality Impedance change ： Refer to individual specification		TLF9UA・TLF25RA： Inductance change：Within±15% TLF14CB： ・Withstanding voltage：No abnormality ・Insulation resistance：No abnormality		CM, TLF： According to JIS C0025 Conditions for 1 cycle Step / Temperature〔℃〕 / Duration〔min〕 1 / −25±3 / 30±3 2 / Room Temperature / Within 3 3 / +85±2 / 30±3 4 / Room Temperature / Within 3 Number of cycles：10 Recovery ： At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2 hrs.
17.Damp heat			TLF9UA・TLF25RA： Inductance change：Within±15% TLF14CB： Withstanding voltage：No abnormality Insulation resistance：No abnormality		TLF： Temperature：60±2℃ ※TLF14CB Temperature：40±2℃ Humidity：90～95%RH Duration：500 hrs Recovery ： At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.
18. Loading under damp heat	Appearance：No abnormality Inductance change ： Refer to individual specification		Withstanding voltage：No abnormality Insulation resistance：No abnormality		CM： Temperature：40±2℃ Humidity：90～95%RH Duration：500（+12, −0）hrs Applied current：Rated current Recovery：1 to 2hrs of recovery under the standard condition after the removal from test chamber. TLF： Temperature：60±2℃ ※TLF14CB Temperature：40±2℃ Humidity：90～95%RH Duration：100 hrs Applied voltage ： Apply the following specified voltage between windings. TLF9UA、25RA / 250VAC TLF9UB / 50VDC ※TLF14CB Duration ： 500 hrs Apply rated current across windings Recovery ： At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.
19.Loading at high temperature			Withstanding voltage ： No abnormality Insulation resistance：No abnormality		TLF： Temperature：85±2℃ Duration：100 hrs Applied voltage ： Apply the following specified voltage between windings. TLF9UA、25RA / 250VAC TLF9UB / 50VDC ※TLF14CB Duration：500 hrs Apply rated current across windings Recovery ： At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.

Item	Specified Value				Test method and remarks
	CM−RA/ BU−RA Type	CM−RB Type	TLF9U TLF14CB	TLF25RA	
20.Low temperature life test	Appearance：No abnormality Inductance change ： Refer to individual specification		TLF9U・TLF25RA： Inductance change：Within±15% TLF14CB： ・Withstanding voltage：No abnormality ・Insulation resistance：No abnormality		CM： Temperature：−40±3℃ Duration：500（+12, −0）hrs Recovery：1 to 2hrs of recovery under the standard condition after the removal from test chamber.（CM−RA） ：1 to 2hrs of recovery under the standard condition after the removal from test chamber.（CM−RB） TLF： Temperature：−25±2℃ ※TLF14CB Temperature：−40±2℃ Duration：500 hrs Recovery ： At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.
21.High Temperature life test	Appearance：No abnormality Inductance change ： Refer to individual specification		TLF9U・TLF25RA： Inductance change：Within±15% TLF14CB： ・Withstanding voltage：No abnormality ・Insulation resistance：No abnormality		CM： Temperature：85±2℃ Duration：500（+12, −0）hrs Recovery：1 to 2hrs of recovery under the standard condition after the removal from test chamber.（CM−RA） ：1 to 2hrs of recovery under the standard condition after the removal from test chamber.（CM−RB） TLF： Temperature：85±2℃ ※TLF14CB Temperature：105±3℃ Duration：500 hrs Recovery ： At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.

CM-RA Type,CM-RB Type,TLF Type

Stages	Precautions	Technical considerations
1.Circuit Design	Operating environment, 1.The products described in this specification are intended for use in general electronic equipment,(office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance.	
2.PCB Design	Design 1.Please design insertion pitches of a base in the pitches that fitted a terminal interval.	1.When Inductors are mounted onto a PC board, hole dimensions on the board should match the lead pitch of the component, if not, it will cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs.
3.Soldering	Wave soldering 1.Please refer to the specifications in the catalog for a wave soldering. 2.Do not immerse the entire Inductors in the flux during the soldering operation. Lead free soldering 1.When using products with lead free soldering, we request to use them after confirming of adhesion, temperature of resistance to soldering heat, etc. sufficiently. Recommended conditions for using a soldering iron Put the soldering iron on the land-pattern. Soldering iron's temperature - Below 350 ℃ Duration - 3 seconds or less The soldering iron should not directly touch the product.	1.If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products.
4.Cleaning	Cleaning conditions 1.TLF type Please contact any of our offices for about a cleaning,	
5.Handling	Handling 1.Keep the product away from all magnets and magnetic objects. Mechanical considerations 1.Please do not give the product any excessive mechanical shocks. 2.TLF type Please do not add any shock or and power to a product in transportation. Packing 1.Please do not give the product any excessive mechanical shocks. In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item).	1.There is a case that a characteristic varies with magnetic influence. 1.There is a case to be damaged by a mechanical shock. 2.TLF type There is a case to be broken by a fall. 1.There is a case that a lead route turns at by a fall or an excessive shock.
6.Storage conditions	Storage 1.To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. ･Recommended conditions Ambient temperature 0～40℃ Humidity Below 70% RH The ambient temperature must be kept below 30℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, product should be used within one year from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage.	1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.